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Methodology:

We used the struct to declare the game to the Node, a node has left/right bank, and a bank has the number of chickens, wolves and the direction of the boat.
For BFS, we used a queue to store the node, and create a vector to store the visited node. We created a move function for all algorithm, during its movement, we wrote a function to check if the node has been visited and if the number of chicken more than wolves. As the solution, check if the node is equal to the goal node. For the DFS, it is similar to BFS, we used the stack for that. Visit the node and its child until visiting the deepest node. As the same, it will also check the node it has visited, and check if the node equal to the goal node. For the IDDFS, we set the max depth to zero(max_depth =0) and run it as same as DFS, the difference is we limited the deep of the search if it didn't find the solution, then let the max depth plus one(max_depth++) until it finds the solution. For A*, we used the sum of the number of chicken, wolves, and boat to create the evaluation function. The distance between the start and goal is the sum of goal node minions the sum of the start node. That is h(n) = sum(goal) - sum(start) And then, used the similar method with BFS to find a solution.

Results:

The expanded nodes for 4 algorithms:

	Test 1	Test 2	Test 3
BFS	14	54	1344
DFS	11	31	387
IDDFS	101	862	325310
A*	13	36	667

Discussion:

All the result is the expected value.

When I utilized uninformed search ways to grab the result, the cost time of each of them is longer than informed search way: A star search.

For the IDDFS, it takes the longest time on the algorithm.

Uninformed search use more computation than informed search.

Uninformed search is more likely a way to find out a path without any algorithms. It just changes a different way to find a path to the target. Informed search tries to seek a lowest-cost method path.

Conclusion:

A-star Search algorithm performs the best. And the IDDFS is the lowest algorithm for this project.

Because we know the distance between each state and the straight distance between the initial state with the current state, the programmer can receive the optimal path by calculating the sum of the pass distance and the straight distance.

A-star search cost the lowest and run the fastest. It is an expected result because of the superiority of informed searches.